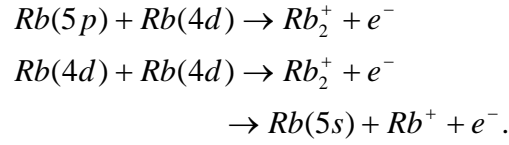


Associative and Penning Ionization in a Rb MOT

M. L. Trachy, H. A. Camp, M. H. Shah, B. D. DePaola
J. R. Macdonald Lab, Kansas State University, Manhattan, KS 66506

M. A. Gearba
Department of Physics and Astronomy, University of Southern Mississippi,
Hattiesburg, MS 39406

Two important loss mechanisms in magneto-optical traps containing excited species are associative and Penning ionization. In a trap containing a mixture of Rb(5s), Rb(5p) and Rb(4d) atoms, a prodigious quantity of ions are produced from the following reactions:



Ionizing collisions involving only Rb(5p) are energetically not allowed in the low temperature MOT environment. By measuring the flight times of the ions extracted from the MOT, we deduce the relative cross sections for the production of ionic dimers and monomers. By additionally measuring the relative populations of Rb(5p) and Rb(4d) we deduce the relative cross sections of all three of the above reactions.